

colours. *Stenopus hispidus*, though so very conspicuous when taken out of the water, was extremely difficult to see in the pool where I found it. I should, in all probability, have failed to notice it, had I not quite unintentionally and blindly touched it with my stick. Like all animals protected by concealment colours, it remained perfectly motionless when alarmed. When looking down on to the growing edge of a reef from a boat on a calm day, it is very difficult at first to see anything but the corals and sponges. After a time, when the eyes become more accustomed to the light, the fish may be distinguished. Those that are coloured blue are much less readily seen than the gold, yellow, and red varieties; but an examination of the fish that I caught myself, and were caught for me by the natives, showed that the fish in which blue is the prevailing colour are much more frequent in the very shallow water, while those that were caught in water from 15 to 20 fathoms were more frequently red or yellow. The blue colour seems to be a protection for the fish from air-breathing enemies—the eagles, ospreys, and hawks—and as these enemies can only approach them from above, the colours are frequently confined to the dorsal sides. The red and yellow colours of the fish seem to be a protection from animals, such as the sharks, perch, and other carnivorous fish, that approach them from the deeper waters beyond the reefs. Thus red and yellow fishes rarely have these colours confined to the upper sides, and many of the blue fishes are coloured red or yellow ventrally.

It is difficult to frame any general rule to account for the curious distribution of the colours of these animals in spots and stripes. Speaking in very general terms, for there are many exceptions, the fish that browse on the corals, possessing small mouths and chisel-shaped teeth (such as the Chatodons, Trigger fish, and Surgeons), are striped; those that feed on other fish, and have large mouths armed with carnivorous teeth, such as the Serranidae, are spotted.

The only example of what appears to be a warning colour that I have noticed occurs in connection with the spines on the tails of certain Surgeons and Trigger fish. *Acanthurus achillis*, for example, has a uniform purple colour, but there is a bright red patch surrounding the formidable tail spines that give these fish the name of Surgeons. Similar warning colours are very pronounced also in *Naseus unicornis* and *Naseus lituratus*, and in some of the Balistidae.

WASHINGTON MAGNETIC OBSERVATIONS, 1886.¹

THIS volume contains the results that have been obtained from the magnetic observations taken at the Naval Observatory during the years 1888 and 1889. The instruments with which they were made were, in the year 1887, placed in their respective buildings that had been erected for that purpose by the Bureau of Navigation. In the construction of these buildings the greatest care was taken to insure the complete elimination of local disturbances. No iron or any magnetic material was used at all, and the fastenings, &c., were entirely of copper, brass, and wood; even the stoves, in which only wood was burnt, were of soap-stone, with copper pipes.

The instruments that were employed consisted of a declinometer, theodolite, portable magnetometer, dip-circle, a set of self-recording magnetographs, a seismoscope, and seismograph; each of them, with the exception of the last two mentioned, being set on piers based on concrete, and in no way connected with the floors of the buildings. To complete the equipment, a compass-testing stand is placed on a pier north of the theodolite, and is capable of motion in an east and west direction. By means of an arm carrying two prisms that have adjusting screws, the opposite marks on the compass card can be placed in the field of view of the theodolite when the latter is directed on the prisms. All the observations, which are represented in tabular form, denote the results that have been obtained after applying all necessary corrections. The tables include, among others, the mean hourly values of the horizontal and vertical force for each month of 1889, and of the declination for each month of 1888 and 1889, the last of which are taken from the monthly curves; declination ordinates for each hour, in minutes of arc taken from daily declination traces; hourly values of horizontal

and vertical force in absolute measure with all corrections; observations of horizontal intensity and dip, with a summary of disturbances in declination which differed two minutes or more from the mean monthly curve.

No less important is the series of the fourteen large plates at the end of the volume. The first shows the way that the daily photographic traces of declination, horizontal and vertical force are recorded; while the second illustrates the mean diurnal variation of the magnetic elements for the year 1889. In this latter plate the curve that gives the integration of these elements—that is, that gives the mean diurnal total force—brings out the fact that in every twenty-four hours there are two maxima and two minima, these latter two occurring between midnight and noon (75th meridian mean time).

Plates iii. to vi. inclusive show the traces of the monthly composite curves of declination for the two years.

In Plates vii. to xiv. most interesting comparison is made of the disturbed days of declination taken from observations at Washington, Los Angeles (California), Toronto (Canada), and Pawlowsk (Russia): the curves are all computed for the same time (*i.e.* for the 75th meridian west of Greenwich), and reduced to the same length of base line. Although on the whole the curves show a more or less equal variation, yet there are some cases in which a decided local variation has taken place. For instance, on January 20, between the hours of noon and four o'clock (75th meridian time), the magnetic declination at Washington, Los Angeles, and Toronto, shows only slight variations, while at Pawlowsk the disturbance is in comparison quite large. Another very interesting case happens on March 17, when the curves traced at Washington and Toronto are quite similar to each other, but different from those traced at the other two places: the curve showing the magnetic disturbances in declination at Pawlowsk being very similar to that indicating the horizontal force at Washington.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The subject of the Rede Lecture, to be given by Sir Alfred Lyall on June 17, is "Natural Religion in India."

The General Board of Studies have again brought forward proposals for the increase of the stipends paid to University Lecturers and Demonstrators in Natural Science, which had to be postponed last year owing to want of funds.

Mr. A. Hutchinson, Demonstrator of Chemistry in Caius College, has been recognized as a Teacher of Chemistry with reference to the regulations for medical degrees.

A Syndicate is proposed by the Council of the Senate for the purpose of considering whether any alternative for Greek should be permitted in the Previous Examination. This is sure to rouse much agitation, but it may be hoped that the long-vexed question will at length be settled in a liberal sense.

Another Syndicate is to consider the office of Superintendent of the Museums of Zoology and Comparative Anatomy, about to be vacated by Mr. J. W. Clark, Registrar. Some rearrangement of the duties, &c., is considered desirable.

SCIENTIFIC SERIALS.

American Journal of Science, May.—On the relationship of the Pleistocene to the pre-Pleistocene formations of the Mississippi basin, south of the limit of glaciation, by T. C. Chamberlain and R. D. Salisbury.—On certain measures of the intensity of solar radiation, by William Ferrel. The author shows that many measures of the intensity of solar radiation are of uncertain value. He specially discusses M. Crova's curves of the relative intensities of solar radiation, obtained at Montpellier with a modified form of the thermopile, called the registering actinometer.—Geological age of the Saganaga syenite, by Horace V. Winchell.—On a self-feeding Sprengel pump, by H. L. Wells.—Contributions to mineralogy, No. 50, by F. A. Genth; with crystallographic notes by S. L. Penfield and L. V. Pirsson. The composition and habits of the following minerals are given: three new varieties of axinite, eudialyte, and monticellite, and titanite from Magnet Cove, Arkansas.—

¹ Appendix I.—"Magnetic Observations." By Ensign J. A. Hoogewerff, U.S. Navy. (Washington: Government Printing Office, 1890.)